

Texas Education Review

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Volume 1, pp. 209-219 (2013)
Available online at www.txedrev.org

Supporting Minority Male Education in Science, Technology, Engineering, and Mathematics (STEM) Disciplines

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This editorial addresses the scarcity of graduates in the science, technology, engineering, and mathematics (STEM) fields in the United States and the potential role of minority males in addressing this problem. The ability of the United States to remain competitive in a global economy is dependent on an adequate number of college graduates in the STEM fields (Chen, 2009; Hira, 2010; National Science Foundation, 2010). In 2007, the National Science Foundation (NSF) projected a shortage of STEM graduates in the United States, as well as decreasing graduation rates in the STEM fields. According to NSF, the shortage would deplete the scientific and engineering workforce in the United States in the 21st century.

The National Science Board of NSF wrote in (2010), “The long-term prosperity of our Nation will increasingly rely on talented and motivated individuals who will comprise the vanguard of scientific and technological innovation” (p. v). The members of the Board found that addressing the shortage of the students in the STEM fields is essential for the continued economic success of the nation and its security. They also emphasized the need to educate all American citizens at different levels on STEM basics to make informed personal choices, to be

educated voters, and to thrive in the increasingly technological global marketplace.

According to the U.S. Department of Commerce (2011), STEM jobs have grown at a rate three times that of non-STEM jobs over the past 10 years. This means that STEM workers play a major role in the growth of our national economy and can help the United States “win the future” (U.S. Department of Commerce, 2011, p. 1). According to the U.S. Department of Commerce (2011) (a) there were 7.6 million STEM workers in the United States in 2010 which represents about 1 in every 18 jobs, (b) STEM jobs have been projected to grow by 17% between 2008 and 2018, (c) STEM workers earn 26% more than non-STEM workers, and (d) even if they do not ultimately work in a STEM-related position, graduates with a STEM degree earn more than graduates with a non-STEM degree. In the past, the United States has benefitted from an influx of international STEM talent rather than relying on an internal STEM pipeline (National Science Foundation, 2010).

Educational policies and practices, including commitment to equity and diversity, are necessary to develop STEM graduates in the United States (National Science Foundation, 2010). However, many students in the United States who attempt educational pathways that would lead to STEM careers have limited academic success (Foster et al., 2010). According to the National Center for Educational Statistics (2010), STEM education policy consists of a largely unorganized set of programs, few of which have evidenced a substantial increase in the number of STEM graduates. If left unaddressed, the shortage of STEM graduates and international talent available to fill jobs in the STEM fields in the United States will worsen in the near future. This is because at the same time graduation rates are dropping in the STEM fields, the number of open job

opportunities in these areas is increasing (National Science Board, 2010).

Current Status of Minority Males in STEM Fields

One possible solution to this problem is increasing the number of minority students in the United States who seek and obtain college degrees in the STEM fields. The United States must eliminate racial barriers in education to widen the STEM pipeline. Today, underrepresented minorities lag behind their White counterparts in K–12 math and science preparation, enrollment in STEM majors in higher education, and participation in STEM careers (Association of Public and Land-grant Universities, 2012).

From a policy perspective, there are several salient arguments for including more minority males in STEM fields. Our nation risks further weakening its diminishing economic and innovative force in a global context if we do not engage communities that have historically been less likely to pursue a STEM education. Technology has changed the way that we operate globally. It requires scientific solutions to health and environmental challenges, demands immediate production and highly engineered solutions, and has an insatiable desire for technological products. Each of these forces ensures the rapid growth in and demand for the STEM workforce.

According to the National Center for Education Statistics (2009) and U.S. Census Bureau (2009), minority males are underrepresented among STEM graduates when compared to White males, and underrepresented among all graduates when compared to minority females. Table 1 shows that although White males made up only 60.5% of the U.S. male population, they obtained 66.6% of STEM degrees. Asian/Pacific Islanders

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was the only underrepresented minority group that was over-represented among STEM graduates, making up only 4.3% of the population but 10.9% of STEM graduates. However, Black males made up 15.4% of the population but only 5.0% of STEM graduates and Hispanic males made up 18.5% of the population but only 6.7% of STEM graduates. The situation was similar for Native American males who made up 1.3% of the population but only .6% of STEM graduates.

Table 1

Comparison of Male U.S. Population and Male STEM Graduates (ages 15 to 24) in 2008

Ethnic Group	Percentage of Population	Percentage of STEM Bachelor's Degrees Awarded
White/Caucasian	60.5%	66.6%
Asian/Pacific Islander	4.3%	10.9%
Black	15.4%	5.0%
Hispanic	18.5%	6.7%
Native American	1.3%	.6%

In 2012, the Association of Public and Land-grant Universities (APLU) presented the results of an assessment of minority males in STEM through its Minority Male STEM Initiative. The purpose of the report was to “gather and examine exemplary practices for recruiting, retaining, and graduating postsecondary science, technology, engineering, and mathematics (STEM) students from underrepresented minority (URM) populations, specifically undergraduate minority males (African Americans, Latinos, Native Americans, Pacific Islanders/Alaska Natives, and Southeast Asians)” (p. 19).

The survey process included administrators, faculty, and students at 14 postsecondary institutions in the United States. The universities included three predominately White institutions, three historically Black colleges and universities, three Hispanic serving institutions, two tribal colleges and universities, and three institutions with high percentages of Asian and Pacific Islander students. The APLU surveyed 1,443 minority male college students to assess (a) demographic and background characteristics, (b) recruitment and retention, (c) educational performance, effort, and aspirations, and (d) educational experiences related to faculty relationships, belonging, and academic pressure. Of the 1,443 students surveyed, 563 (39.0%) were majoring in a STEM field. In addition, over 200 faculty members and administrators at the 14 institutions were interviewed.

Key findings from the APLU (2012) study were:

1. Male minority students at predominantly White institutions reported that their professors were insensitive to their cultural background and found their professors to be less approachable than students at institutions that served primarily minority individuals.

2. Male minority students at predominantly White institutions reported less positive views of their relationships with faculty members and had less of a sense of belonging than students at institutions that served primarily minority individuals.

3. Male minority students at predominantly White institutions reported enjoying their STEM courses less and feeling less supported by peers in those courses than students at institutions that served primarily minority individuals.

4. Formal programs to recruit minority males in STEM fields were rare among all of the institutions surveyed, with only 10% of administrators and faculty members able to identify a specific outreach program. This lack of formal programs impeded efforts at universities to recruit and retain minority males in STEM fields.

5. Many of the faculty and administrators across all of the institutions surveyed believed that improvements in their efforts to recruit and retain minority males in STEM fields would result from hiring more minority faculty members.

6. The faculty members and administrators understood that they had difficulties in recruiting and retaining minority males in STEM fields but were unsure how to deal with the challenge of increasing their numbers.

Supporting Minority Males in STEM Fields

There are a variety of factors that can increase the likelihood of minority males choosing to seek an education in the STEM fields. For example, Harper (2010) reported that having same-race role models in a STEM area contributed to “fostering a sense of belonging” (p. 72) in the STEM fields. Based on their 2012 study, the APLU provided several recommendations for how to increase the number of minority males who obtain STEM

degrees including: comprehensive programs to collect, analyze, and use university-level outcome data; increases in federal funding for targeted efforts aimed at minority males; and building partnerships among government, educational institutions, and private sector organizations.

Further, minority male students at minority-serving institutions felt that their professors were more sensitive to their cultural backgrounds and approachable. They also reported that they enjoyed their STEM courses more and felt more supported by peers than students at institutions that served primarily White students. Consequently, the APLU emphasized the importance of involvement of national minority-serving institution organizations such as the National Association for Equal Opportunity in Higher Education, the Hispanic Association of Colleges and Universities, and the American Indian Higher Education Consortium (National Association for Equal Opportunity in Higher Education, 2011).

Conclusions

This editorial draws attention to the problem of the scarcity of graduates in the STEM fields in the United States, emphasizes the potential role of minority males in addressing this problem, examines current data including the results from the APLU (2012) study, and offers recommendations to administrators at educational institutions and policymakers. Increasing the number of graduates in the STEM fields is important to the safety, security, and economic success of the United States and its citizens (Chen, 2009; Hira, 2010; National Science Foundation, 2010). Despite the growing need for graduates in the STEM fields, students in the United States too frequently choose educational pathways that do not lead to success in STEM careers (Foster et al., 2010). As graduation

rates drop in the STEM fields, the number of open job opportunities in these areas is increasing (National Science Board, 2010).

This problem can be partially addressed by increasing the number of minority students who obtain degrees in the STEM fields. Results summarized above indicate that minority males are underrepresented among STEM graduates relative to their population representation (National Center for Education Statistics, 2009; U.S. Census Bureau, 2009).

Results from the APLU (2012) study on their Minority Male STEM Initiative further clarified the important role that minority males can have in increasing the number of STEM graduates in the United States and provided several recommendations related to both funding and relationship building. However, the APLU focused on the role that minority-serving institutions can have. Harper (2010) reported that having same-race role models in a STEM area contributed to “fostering a sense of belonging” (p. 72) in the STEM fields, and the results from the APLU study confirmed that minority students at minority-serving institutions felt more of a sense of belonging than those at predominantly White institutions. Although all institutions should strive to foster a sense of belonging among their students, the role of minority-serving institutions is underscored by their existing capabilities to do this.

In addition to fostering a sense of belonging, the results from the APLU (2012) study indicated that minority students at minority-serving institutions enjoyed a learning environment that was more conducive to persistence and graduation in STEM. Thus, the conclusion from the APLU report was that policy makers should focus on ways to maximize the role of these institutions in addressing the shortage of minority males in STEM

programs as a solution to the national shortage of STEM graduates.

Specifically, the findings suggest that few institutions have formal programs to recruit minority males in STEM. Faculty at minority serving institutions should be able to identify specific outreach programs to recruit minority males in STEM fields, beyond those national programs, which were tied to external funding. Institutional representatives should design programs to fit their unique recruitment and retention needs.

Faculty and administrators note that successful recruitment initiatives include having minority scholarships, mentoring, faculty participation, community outreach, research experiences, and strategies to build learning communities. Federal investment in minority serving institutions is critical for them to realize their respective missions, to achieve long-term financial stability and to develop programs, policies, and practices that promote recruitment, retention, and graduation among the minority students they so diligently serve.

Lorenzo Lamar Esters leads Kentucky State University's efforts to enhance the recruitment, retention, and graduation of students, serving as its Vice President for Student Success and Enrollment Management. From 2009 to 2012 he served as Vice President for the Association of Public and Land-Grant Universities' Office for Access and the Advancement of Public Black Universities. Lorenzo holds a bachelor's degree in English from Rust College, a master's degree in English from Jackson State University, and a doctoral degree in higher education administration from Morgan State University.

Ivory A. Toldson recently was appointed by President Obama as the Deputy Director of the White House Initiative on Historically Black Colleges and Universities (HBCUs). Previously, he was an associate professor at Howard University, senior research analyst for the Congressional Black Caucus Foundation, and editor-in-chief of *The Journal of Negro Education*. Toldson also is the author of “The Breaking Barriers Series” that analyzes academic success indicators from national surveys, which together give voice to more than 10,000 Black male pupils from schools across the country, and the co-editor of the book, *Black Male Teachers: Diversifying the Nation’s Teacher Workforce*.

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